PUBLIC SECTOR EFFICIENCY: EVIDENCE FOR NEW EU MEMBER STATES AND EMERGING MARKETS*

António Afonso,[$ #] *Ludger Schuknecht* [#] *and Vito Tanzi* [±]

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$ ISEG/UTL – Technical University of Lisbon, Department of Economics; UECE – Research Unit on Complexity in Economics, R. Miguel Lupi 20, 1249-078 Lisbon, Portugal, email: aafonso@iseg.utl.pt. UECE is supported by FCT (Fundação para a Ciência e Tecnologia, Portugal), under the POCTI program, financed by ERDF and Portuguese funds.

European Central Bank, Kaiserstraße 29, D-60311 Frankfurt am Main, Germany, emails: antonio.afonso@ecb.int; ludger.schuknecht@ecb.int.

± Inter-American Development Bank, Washington, D. C., email: vitot@contractual.iadb.org.

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Abstract

In this paper we analyse public sector efficiency in the new member states of the European Union compared to that in emerging markets. After a conceptual discussion of expenditure efficiency measurement issues, we compute efficiency scores and rankings by applying a range of measurement techniques. The study finds that expenditure efficiency across new EU member states is rather diverse especially as compared to the group of top performing emerging markets in Asia. Econometric analysis shows that higher income, civil service competence and education levels as well as the security of property rights seem to facilitate the prevention of inefficiencies in the public sector.

Keywords: government expenditure, efficiency, DEA, new EU member states, emerging markets.

JEL Classification Numbers: C14, H40, H50.

Non-technical summary

The importance of the efficient use of public resources and high-quality fiscal policies for economic growth and stability and for individual well-being has been brought to the forefront by a number of developments over the past decades. Macroeconomic constraints limit countries' scope for expenditure increases. The member states of the European Union are bound to fiscal discipline through the Stability and Growth Pact. Globalisation makes capital and taxpayers more mobile and exerts pressure on governments' revenue base. New management and budgeting techniques have been developed and there is more scope for goods and service provision via markets. Transparency of government practices across the globe has increased, raising public pressure to use resources more efficiently.

Our contribution in this study is essentially threefold: first we discuss and survey conceptual and methodological issues related to the measurement and analysis of public sector efficiency. Second we construct Public Sector Performance and Efficiency composite indicators for the ten new member states that acceeded to the European Union (EU) on 1 May 2004 as compared to emerging markets from different regions, future EU candidate countries and some current EU member countries that show features of emerging markets and/or are undergoing a catching up process. Third we use Data Envelopment Analysis to compute input and output efficiency scores and country rankings, which we combine with a Tobit analysis to see whether exogenous, non-discretionary factors play a role in explaining expenditure inefficiencies. To our kowledge, such an efficiency analysis has not been applied before to this set of countries.

The Public Sector Performance and Efficiency composite indicator includes information on administrative, education, health, income distribution, economic stability, and economic performance outcomes. It is interesting to see that a relatively strong performance of the new EU member states on human capital/education and income distribution contrasts with a relatively weak one for economic performance and stability. There is no clear pattern of distinction between Baltic and Central European countries while the two island countries post strong values for all indicators for which data is available. Asian Emerging economies performed very strongly on administration, human capital and economic stability and growth. Overall performance was very equal as regards health indicators.

The results of our analysis show that expenditure efficiency across new EU member states is rather diverse, especially compared to the group of top performing emerging markets in Asia. From the analysis of composite public sector performance (PSP) and efficiency (PSE) scores we find that countries with lean public sectors and public expenditure ratios not far from 30% of GDP tend to be most efficient. PSE scores of the most efficient countries are more than twice as high as those of the poorest performers.

From the DEA results we see that a small set of countries define, or are very close to, the theoretical production possibility frontier: Singapore, Thailand, Cyprus, Korea, and Ireland. From an input perspective the highest ranking country uses 1/3 of the inputs as the bottom ranking one to attain a certain public sector performance score. The average input scores suggest that countries could use around 45 per cent less resources to attain the same outcomes if they were fully efficient. Average output scores suggest that countries are only delivering around 2/3 of the output they could deliver if they were on the efficiency frontier.

Finally we examine via Tobit analysis the influence of non-discretionary factors, notably non-fiscal variables, on expenditure efficiency. Our analysis suggests that the security of property rights, per capita GDP, the competence of civil servants, and the education level of people positively affect expenditure efficiency. Due to significant correlation, however, the two competence/education variables are only significant in separate regressions while the other two variables are robust over all specifications. International trade openness, trust in politicians and transparency of the political system have not been found to display a significant influence on expenditure efficiency (even though only the coefficient for public trust in politicians had the wrong sign).

I. Introduction

The importance of the efficient use of public resources and high-quality fiscal policies for economic growth and stability and for individual well-being has been brought to the forefront by a number of developments over the past decades. Macroeconomic constraints limit countries' scope for expenditure increases. The member states of the European Union are bound to fiscal discipline through the Stability and Growth Pact. Globalisation makes capital and taxpayers more mobile and exerts pressure on governments' revenue base. New management and budgeting techniques have been developed and there is more scope for goods and service provision via markets. Transparency of government practices across the globe has increased, raising public pressure to use resources more efficiently (see also Tanzi and Schuknecht (2000), Heller (2003), Joumard, Konsgrud, Nam and Price (2004)).

The adequate measurement of public sector efficiency is a difficult empirical issue and the literature on it, particularly when it comes to aggregate and international data, is rather scarce. The measurement of the costs of public activities, the identification of goals and the assessment of efficiency via appropriate cost and outcome measures of public policies are very thorny issues. Academics and international organisations have made some progress in this regard by paying more attention to the costs of public activities via rising marginal tax burdens and by looking at the composition of public expenditure. Moreover, they have been shifting the focus of analysis from the amount of resources used by ministry or programme (inputs) to the services delivered or outcomes achieved (see, for instance, OECD (2003), Afonso, Ebert, Thöne and Schuknecht, (2005), and Afonso, Schuknecht and Tanzi (2005)).

Our contribution in this study is essentially threefold: first we discuss and survey conceptual and methodological issues related to the measurement and analysis of public sector efficiency. Second we construct Public Sector Performance and Efficiency composite indicators for the ten new member states that adhered to the European Union (EU) on 1 May 2004 as compared to emerging markets from different regions, future EU candidate countries and some current EU member countries that show features of emerging markets and/or are undergoing a catching up process.[1] Third we use Data Envelopment Analysis to compute input and output efficiency scores and country rankings, which we combine with a Tobit

[1] A method pioneered by Afonso, Schuknecht and Tanzi (2005).

analysis to see whether exogenous, non-discretionary (and non-fiscal) factors play a role in explaining expenditure inefficiencies.[2] To our kowledge, such an efficiency analysis has not been applied before to this set of countries.

On the second and third objective, the study finds significant differences in expenditure efficiency across new member countries with the Asian newly industrialised economies performing best and the new member states showing a very diverse picture. The econometric study shows that income, public sector competence and education levels as well as the security of property rights seem to facilitate the prevention of inefficiencies in the public sector.

The paper is organised as follows. In section two we discuss conceptual issues regarding public expenditure efficiency. In section three we present the methodologies used for the measurement of public expenditure efficiency. Section four reports stylised facts regarding the new EU member states and various ways for assessing public sector efficiency: via i) performance and efficiency analysis based on cross-country composite indicators, ii) a non-parametric efficiency analysis, and iii) an explanation of inefficiencies via non-discretionary factors. Section five concludes.

II. Measuring efficiency in public expenditure: conceptual issues

Economists are concerned about the efficient use of scarce resources. The concept of efficiency finds a prominent place in the study of the spending and taxing activities of governments. Economists believe that these activities should generate the maximum potential benefits for the population and they castigate governments when, in their view, they use resources inefficiently. International organisations, such as the World Bank and the IMF, often express concern about governmental activities that they consider inefficient or unproductive.

Like the proverbial elephant, efficiency or, more often inefficiency, is easier to recognize than to define objectively and precisely. Merriam Webster reminds us that

[2] See also Gupta and Verhoeven (2001), Clements (2002), St. Aubyn (2003), Afonso, Schuknecht, and Tanzi (2005) Afonso and St. Aubyn (2005a, b), the latter including a combination of non parametric with econometric analysis.

efficiency has to do with the comparison between input, and output or between costs and benefits. At a given input, the greater the output, the more efficient an activity is. A machine is efficient when, at a given cost, it produces the largest possible output. For example, a furnace is efficient when it produces a good amount of heat at a given cost. A car is efficient when it goes a good number of miles with a gallon of gasoline.

The measurement of efficiency generally requires: (a) an estimation of costs; (b) an estimation of output; and (c) the comparison between the two. Applying this concept to the spending activities of governments, we can say that public expenditure is efficient when, given the amount spent, it produces the largest possible benefit for the country's population. Here the word benefit is used because economists often make a distinction between output and outcome, a distinction to which we shall return later.

Often efficiency is defined in a comparative sense: the relation between benefits and costs in country A is compared with that of other countries. This can be done for total government expenditure, or for expenditure related to specific functions such as health, education, poverty alleviation, building of infrastructures and so on. If in country A the benefits exceed the costs by a larger margin than in other countries, then public expenditure in country A is considered more efficient.

The simple comparison outlined above requires that both costs and benefits be measured in acceptable ways. This is easy, or easier, for machines (cars, furnaces) but difficult for governmental activities. It is often difficult to measure the benefits from a governmental expenditure. But, one could assume that, at least the costs (i.e., the resources used) should be easy to determine. Unfortunately, this is not always so. Deficient budgetary classifications, lack of reliable data, difficulties in allocating fixed costs to a specific function, and failure to impute some value to the use of public assets used in the activity can also hamper the determination of real costs.

II.1. Measuring costs

A problem that arises from the comparison of, say, the efficiency of a car or a furnace with that of public spending is that additional amounts of inputs such as gasoline, petroleum or electricity can normally be bought by a consumer at the same price as previous amounts. In

other words it is possible to assume a perfectly elastic supply curve for the input used by an individual. This, however, is not the case for public spending. Public spending is financed by tax revenue and more revenue can be obtained only at progressively higher marginal costs.

It is a well established conclusion, supported by both theory and empirical work, that, once a tax administration is in place, the marginal cost of tax revenue is generally higher than the average cost, and that marginal costs can increase rapidly. This is true in all countries but perhaps more so in emerging markets and developing countries. These countries face great difficulties in establishing good and efficient tax systems. As a consequence, they must often rely on revenue sources that impose: (a) dead weight costs, because of the distortions and the disincentives that they impose on the economy; (b) high costs for the countries' tax administrations; and (c) high compliance costs for the taxpayers. Thus, the true cost to the economy of the marginal dollar collected in taxes can significantly exceed the dollar received by the government. The assumption of a perfectly elastic supply curve for tax revenue is not tenable.

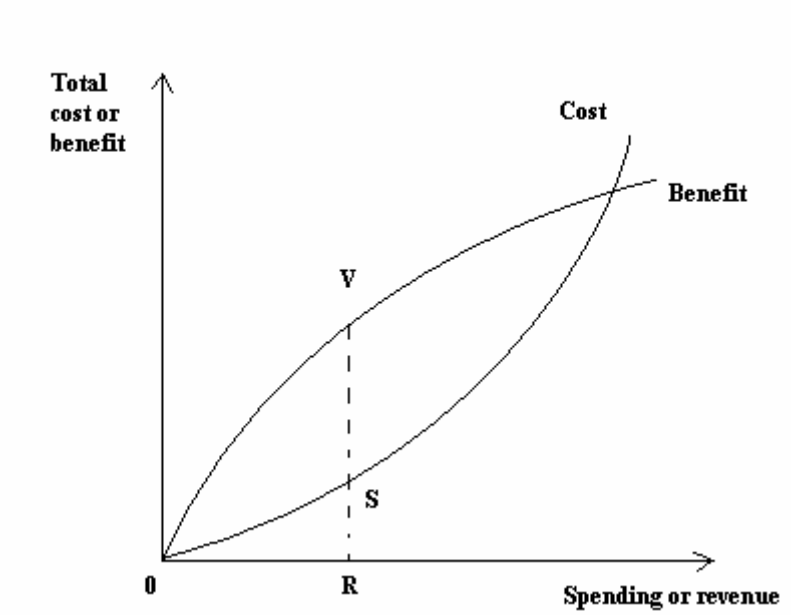
Each additional dollar of spending, requiring an additional dollar of revenue, will impose additional and rising marginal costs on the economy unless that dollar comes from reducing some other spending. The concept of efficiency in public spending must take this into account. Both the level of taxation and the quality of the tax system should become essential elements for the evaluation of the efficiency of public spending. This is quite apart from whether the use to which the tax revenue is put is efficient or not. An analysis that focused only on the use of revenue would be missing these important aspects.

A simple graphical presentation can explain more formally this important, obvious, but often-ignored point. It is made ignoring, for the time being, the efficiency in the actual use of the tax revenue. The focus, here, is on the efficiency in the tax collection side.

In Figure 1, the vertical axis measures both the benefits from public expenditure to the country's population and the costs imposed by the taxes collected. It is assumed that the same unit of measurement can be used to measure both. The vertical axis reflects total benefits from public expenditure and total costs of taxation. These costs include, in addition to the monetary payment made by the citizens' dead weight costs, administrative costs, and compliance costs.

When the tax administration is corrupt, they include also bribes paid by the taxpayers to the corrupt tax administrators.

Figure 1 – Total costs and benefits



The budgetary or monetary value of public expenditure and the tax revenue to cover the expenditures are both measured, in dollars, on the horizontal axis. More public expenditure is supposed to bring more benefits to the population. Thus the curve is positively sloped. However, the marginal benefit from each additional dollar spent can be expected to fall as more dollars are spent. Thus, the curve that reflects total benefits is concave downward, i.e., its second derivative is negative. Curve OVB in Figure 1 describes this behaviour.

As more taxes are collected, each additional dollar collected becomes more costly. Therefore, the curve, OSC, describing the total costs of taxation is concave upward, i.e., its second derivative is positive.

At a level of public expenditure equal to OR, the slopes of the two curves are equal which means that the true cost of the last dollar spent is exactly equal to the benefit created by that spending. Before point R, increasing tax revenue and public spending increases net benefits which are measured by the vertical distance of the two curves. Beyond point R, the marginal cost of taxation exceeds the marginal benefits from spending. VS is the largest vertical distance between the two curves. Thus the optimal level of public expenditure is OR.

There are other reasons why the budgetary costs of an activity can underestimate the true costs of the activity. We shall mention two such reasons. The first is that most governments do not consider in their budgetary estimates of the costs of particular activities (education, defence, etc.) the opportunity costs of using government-owned assets such as buildings, land, forests and so on. For example the budgetary cost of a school includes the costs of teachers' salaries, school equipment and so on but it often does not include the rental value of the government-owned building used. The same is true for the cost of jails, for the cost of military bases, to name a couple of examples. This means that the budgets, and especially those for particular categories of spending, often, and at times substantially, underestimate, the true costs of these activities.[3]

Still another reason for the underestimation of the costs of particular activities is the difficulty of allocating government fixed costs among the particular activities. When, for example, the educational budget is considered in relation to the benefits from the spending, that budget will not include any part of the fixed costs of running a government. These costs for example should include parts of the activities of parliaments, the president's office and so on.

II.2. Efficiency with wrong goals

It is difficult to recognize in the analysis of efficiency in public expenditure that expenditure can be efficient in a technical sense – i.e. the goal pursued is pursued at low cost – but nevertheless can be inefficient in the sense of public interest or social welfare. This occurs when the government efficiently produces the wrong output. This is the classic case of guns versus butter. A government may be producing public defence efficiently but it may be producing too much of it (too many guns) and too little of other social goods (health, education) compared to what the population would prefer to have.

This is clearly a political problem. In a democratic society that operates well with checks and balances at the political level, the executive branch, under the control of a democratically elected parliament, determines the size and the composition of the budget. This budget can be assumed to reflect legitimately the goals of the population. In this case,

[3] A discussion of this point is contained in Tanzi and Prakash (2003).

the main question is the technical one of how efficiently the money assigned to each function is being spent. Thus, we could talk about technical inefficiency and not about political, or goal related, inefficiency.

Unfortunately, much of the world is not made up of well functioning democracies. The problem of "state capture" is a common one and one that has received much attention on the part of the World Bank. But even when "state capture" is not a problem, powerful lobbies and corruption can divert the budget towards goals that are not identical with those that would reflect the public interest. In these situations the definition of efficiency becomes less clear.

In conclusion it is important to recognize the distinction between producing the wrong output (i.e. allocating the budget to the wrong activities) but spending the money in a technically efficient (i.e. low cost) way; and allocating the budget to the right activities (i.e. so much for health, so much for education, etc) but doing it in an inefficient (i.e. high cost) way. Both of these problems are common and important, and both lead to inefficiency in the use of resources. Unfortunately in many situations one finds both problems, that is, the wrong output is produced and it is produced in an inefficient way.

II.3. Efficiency with right goals

In the previous sub-section we have discussed the possibility that, for various reasons, the budget gets distorted towards goals (defence, etc.) that the majority of the population may see as lower priorities than socio-economic goals such as health, education, support for poor groups, high growth and so on. Suppose, however, that the budget allocates proportions that may be considered appropriate toward popular expenditures such as health and education. UN Guidelines have at times recommended that governments allocate specific proportions of their budgets to particular social functions. In these situations various problems may arise that would tend to make the public spending less efficient than it could be. Let us mention some of these problems.

First, a problem similar to the one mentioned in the previous section is the hijacking of the expenditure for the specific benefit of special pressure groups. For example educational spending may be redirected from primary education towards secondary or tertiary education or from scientific subjects toward law, finance and so on; health spending may be diverted

from prevention to hospital care; or from rural to urban areas; or from basic health to modern hospitals in big cities; or the resources may be allocated from diseases that affect mostly poorer people, such as malaria toward old people or "higher income" diseases. These redirections within a budgetary category are often important in determining the benefits that come out from the expenditure for a basic function; they are important in determining efficiency even when they do not change the total amounts spent for the category.

Second, and a problem that has attracted little attention, is the administrative hijacking of the budgeted resources by the provider of the services. For certain public functions and especially for those that are labour-intensive, such as education and health, the role of the providers of the services, (school teachers, administrators, doctors, nurses and so on) is fundamental. Unlike cash transfers (as for the payment of pensions) that are received directly by the legal beneficiaries, much of the actual spending for activities such as education and health goes to the salaries of the public employees that provide the services. In exchange for the salaries received these employees are supposed to produce an output in the form of services that benefit patients, school children and other users in terms of good health, more literacy, more human capital and so on.

There has been a tendency among economists to measure the output or the benefit in these activities on the basis of the budgeted allocation: the higher the expenditure, the higher the benefit. For example calls to allocate a given, or a larger, share of national budgets to health and education assume the identity between expenditure and benefits. The larger the expenditure, the greater the benefits received by the intended destinatories are assumed to be. But, as argued already by Tanzi a long time ago (1974) the two can be widely different. This difference is central to the concept of efficiency.

Health, education and similar activities absorb a large share of the government payroll and the personnel who work for the government. Through high salaries they can absorb a large share of the budget allocated to these activities thus leaving little for ancillary needs. This is especially the case when those who work in these activities (school teachers, doctors, nurses) are well organized politically. If mostly higher salaries absorb additional resources allocated to these activities and the higher salaries are not accompanied by higher productivity of the public employees, the higher public spending can be unproductive and produce little additional benefits to the students or patients. This may happen even in presumably well-run

countries. For example, Aninat at al. (1999) referred to the Chilean experience where a tripling of the real public spending on health over a few years did not produce any visible or measurable increase in the quantity or quality of the services to those who used the public health system. The increase in spending simply resulted in rents for the doctors and/or nurses. In other countries large increases in educational spending had little impact on educational output.

In connection with the above point we need to return to the question of the distinction between output and outcome. This distinction should be fundamental in the analysis of the efficiency of public spending. There is often much attention paid to the outputs of certain activities and too little to the outcomes. For example the outputs of educational spending may be school enrolments, or number of students completing a grade. The outputs of health expenditure may be the number of operations performed or days spent in a hospital bed. However, the outcomes should be based on how much students learned and how many patients got well enough to return to a productive life.

Third, corruption in its various forms has a deleterious effect on public expenditure efficiency or productivity. Corruption may be linked to the existence of ghost workers, i.e. individuals who receive a salary from the government but who never show up on the job; or, in some extreme cases, are literally inexistent. It may be linked to individuals who have double jobs and who spend as little time and energy at the government job as possible. It may be linked to individuals who often do not show up in their jobs claiming illness or some other reasons. It may be linked to the assignment of incompetent individuals in sensitive jobs or to overstaffing and nepotism, and so on. There is little question that corruption and inefficiency are often two sides of the same coin so that reduction of corruption becomes a sine qua non for an increase in efficiency. However, the effect of corruption is more likely to be noted in outcomes then in outputs of public spending.

Finally, what we call inefficiency may be the result of cultural factors, such as attitude toward work; climatic factors, that make it difficult to work in certain periods, such as summers, afternoons, etc.; traditions, such as number and length of religious holidays, and so on. These factors may generate what, borrowing a term from the economic development literature, could be called an X-inefficiency factor, which is difficult to define and measure but which exists nevertheless and is likely to play a significant role.

III. Measuring efficiency in public expenditure: methodologies

III.1. Composite indicators for measuring public sector performance and efficiency

In recent years various attempts have been made at measuring the efficiency of public expenditure via composite indicators. These attempts are of two broad types: macro measurements, and micro measurements. Macro measurements aim at estimating the efficiency of total public spending. Micro measurements aim at measuring the efficiency of particular categories of public spending. These methods try to make progress in tackling the most important measurement challenges: they aim to identify appropriate objectives, they measure outcomes of public sector activities that proxy these objectives (rather than inputs), and they set these in relation to the costs (expenditure and taxes).

Macro measurements have as their aim an evaluation of public spending in its entirety. In other words they attempt to measure, or rather to get some ideas of, the benefits from higher public spending. When, for example, Sweden spends 1 ½ times as much in terms of GDP shares as Switzerland, what does it get in return? Micro measurements attempt to determine the relationship between spending and benefits in a particular budgetary function or even sub-function (i.e., health spending or the efficiency of spending in hospitals, or spending for protection against malaria, aids, etc.).

A first and simple macro measurement attempt was made by Tanzi and Schuknecht (1997, 2000) in trying to assess the benefits from total public spending in 18 industrialized countries. The approach attempts to determine whether larger public spending in these industrialized countries provided returns, in terms of some identifiable benefits, that could justify the additional costs, including the limitation in individual economic freedom associated with higher tax burdens, imposed by that additional spending. The key question that it tries to address is whether there is a positive, identifiable relationship between higher public spending and higher social welfare.

This approach is a comparative method which uses data on various socio-economic indicators that are available for groups of countries. The countries are classified in terms of the level of (or the increase in) public expenditure. Then public spending is related to the

values of, or the changes in, the socio economic indicators. The greater the positive impact of higher spending on the indicators, the more efficient public expenditure is assumed to be.

The application of this method led the authors to conclude that additional public expenditure had not been particularly productive in recent decades. The group of countries with lower levels of public spending had socio-economic indicators that were as good as or at times better than the countries with much higher spending levels.[4]

Afonso, Schuknecht, and Tanzi (2005) refined this approach and built composite indicators of public sector performance. They distinguished public sector performance (PSP), defined as the outcome of public policies, from public sector efficiency, defined as the outcome in relation to the resources employed. This is also the first method we apply to the new member and emerging market analysis later in the paper.

Assume that public sector performance (*PSP*) depends on the values of certain economic and social indicators (*I*). If there are *i* countries and *j* areas of government performance which together determine overall performance in country *i*, PSP_i, we can then write

$$PSP_i = \sum_{j=1}^{n} PSP_{ij} \ , \qquad (1)$$

with $PSP_{ij} = f(I_k)$.

Therefore, an improvement in public sector performance depends on an improvement in the values of the relevant socio-economic indicators:

$$\Delta PSP_{ij} = \sum_{i=k}^{n} \frac{\partial f}{\partial I_k} \Delta I_k \ . \qquad (2)$$

The performance indicators are of two kinds: process or opportunity indicators, and traditional or Musgravian indicators. As a first step, they defined seven sub-indicators of public

[4] For industrialized countries there is also no apparent relationship between the level of public spending and the values of the UNDP's "Human Development Index". See Tanzi (2004).

performance. The first four look at administrative, education, health and public infrastructure outcomes. Each of these sub-indicators can contain several elements. For example, "administrative" includes indicators for corruption, red tape, quality of judiciary, and the shadow economy. These are averaged to give the value for "administrative" performance. Health includes infant mortality and life expectancy etc. A good public administration, a healthy and well-educated population, and a sound infrastructure could be considered a prerequisite for a level playing field with well-functioning markets and secure property rights, where the rule of law applies, and opportunities are plenty and in principle accessible to all. These indicators thereby try to reflect the quality of the interaction between fiscal policies and the market process and the influence this has on individual opportunities.

The three other sub-indicators reflect the "Musgravian" tasks for government.[5] These try to measure the outcomes of the interaction with, and reactions to, the market process by government. Income distribution is measured by the first of these indicators. An economic stability indicator illustrates the achievement of the stabilisation objective. The third indicator tries to assess allocative efficiency by economic performance. Once again each of these traditional indicators may be made up of various elements. For example stability is made up of variation in output around a trend and inflation. Finally all sub-indicators are used to compute a composite public sector performance indicator by giving the sub-indicators equal weights. The values are normalized and the average is set equal to one. Then the PSP of each country is related to this average and deviations from this average provide an indication of the public sector performance of each of country.

However, these performances reflect outcomes without taking into account the level of public spending. They ignore the costs in terms of public expenditure. To get some values of public sector efficiency (PSE), the public sector performance (PSP) is weighted by the relevant category of public expenditures.

We weigh performance (as measured by the PSP indicators) by the amount of relevant public expenditure that is used to achieve a given performance level. In order to compute these so-called efficiency indicators, public spending was normalised across countries, taking the average value of one for each of the six categories specified above. To get some values of

5 The conceptual separation between "opportunity" and standard "Musgravian" indicators is of course somewhat artificial as, for example, health and education indicators could also be seen as indicators of allocative efficiency.

public sector efficiency (PSE) the public sector performance (PSP) is weighted by the public expenditures as follows:

$$PSE_i = \frac{PSP_i}{PEX_i}, \tag{3}$$

with

$$\frac{PSP_i}{PEX_i} = \sum_{j=1}^{n} \frac{PSP_{ij}}{PEX_{ij}}. \tag{4}$$

The input measures for opportunity indicators are:

(1) Public consumption as proxy for input to produce administrative outcomes (explained later in section IV.2.1);
(2) Health expenditure (for health performance/outcome indicators);
(3) Education expenditure (for education performance).

Our earlier study also included a measure of the outcome of public investment, but due to a lack of comparable data, this measure is not used in this study.

Inputs for the standard or "Musgravian indicators" are:

(1) Transfers and subsidies as proxies for input to affect the income distribution;
(2) Total spending as proxy for the input to affect economic stabilization (given that larger public sectors are claimed to make economies more stable);[6] and
(3) Total spending also as a proxy input for economic efficiency and the distortive effects of taxation needed to finance total expenditure.

However, there are some caveats: it is not easy to accurately identify the effects of public sector spending on outcomes and separate the impact of public spending from other

[6] For a differing view on the limits of the stabilising effect of growing government, see Cuaresma, Reitschuler and Sillgoner (2005) and Buti and van den Noord (2003).

influences. Moreover, comparing expenditure ratios across countries implicitly assumes that production costs for public services are proportionate to GDP per capita.[7]

III.2. Non-parametric analysis of performance and efficiency

Some recent papers have used non-parametric approaches for measuring relative expenditure efficiency across countries. One such approach is the Free Disposal Hull (FDH) analysis.[8] This analysis is broadly based on the concept of X-efficiency advanced by Leibenstein (1966). In the words of Gupta and Verhoeven (2001), the "...central premise of the FDH Analysis is...that a producer is relatively inefficient if another producer uses less or an equal amount of input to generate more or as much output."

An alternative non-parametric technique that has recently started to be applied to expenditure analysis is Data Envelopment Analysis (DEA). This technique, which is applied also later in this study, was originally developed and applied to firms that convert inputs into outputs (Coelli, Rao and Battese (1998) and Sengupta (2000) for a number of applications). The term "firm", sometimes replaced by the more encompassing term "Decision Making Unit" (henceforth DMUs) may include non-profit or public organisations, such as hospitals, universities, local authorities, or countries.

The DEA methodology, originating from Farrell's (1957) seminal work and popularised by Charnes, Cooper and Rhodes (1978), assumes the existence of a convex production frontier.[9] The production frontier in the DEA approach is constructed using linear programming methods. The term "envelopment" stems from the fact that the production frontier envelops the set of observations.[10]

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[7] See Afonso, Schuknecht, and Tanzi (2005) for a discussion of the several caveats of such approach.

[8] These approaches also often suffer from the logical fallacy of "post hoc non est propter hoc". They attribute the outcomes or the benefits to the expenditure when other factors may have contributed to these outcomes or benefits. For example, effects from changing diets may be attributed to expenditure on health. In addition, many of these approaches suffer from the difficulty of distinguishing output from outcomes. For an overview of the FDH analysis see for instance Tulkens (1993).

[9] Deprins, Simar, and Tulkens (1984) first proposed the FDH analysis which relaxes the convexity assumption maintained by the DEA model.

[10] Technical efficiency is one of the two components of total economic efficiency. The second component is allocative efficiency and they are put together in the overall efficiency relation: *economic efficiency = technical efficiency × allocative efficiency*. A DMU is technically efficient if it is able to obtain maximum output from a set of given inputs (output-oriented) or is capable to minimise inputs to produce the same level of output (input-oriented). On the other hand, allocative efficiency reflects the DMUs ability to use the inputs in optimal proportions. Coelli et al. (1998) and Thanassoulis (2001) offer introductions to DEA, while Simar and Wilson (2003) and Murillo-Zamorano (2004) are good references for an overview of frontier techniques.

Regarding public sector efficiency, the general relationship that we expect to test can be given by the following function for each country *i*:

$$Y_i = f(X_i), \; i=1,\ldots,n \qquad (5)$$

where we have Y_i – a composite indicator reflecting our output measure; X_i – spending or other relevant inputs in country *i*. If $Y_i < f(x_i)$, it is said that country *i* exhibits inefficiency. For the observed input level, the actual output is smaller than the best attainable one and inefficiency can then be measured by computing the distance to the theoretical efficiency frontier.

The purpose of an input-oriented example is to study by how much input quantities can be proportionally reduced without changing the output quantities produced. Alternatively, and by computing output-oriented measures, one could also try to assess how much output quantities can be proportionally increased without changing the input quantities used. The two measures provide the same results under constant returns to scale but give different values under variable returns to scale. Nevertheless, and since the computation uses linear programming not subject to statistical problems such as simultaneous equation bias and specification errors, both output and input-oriented models will identify the same set of efficient/inefficient producers or DMUs.[11]

The analytical description of the linear programming problem to be solved, in the variable-returns to scale hypothesis, is sketched below for an input-oriented specification. Suppose there are *k* inputs and *m* outputs for *n* DMUs. For the i-th DMU, y_i is the column vector of the inputs and x_i is the column vector of the outputs. We can also define *X* as the $(k \times n)$ input matrix and *Y* as the $(m \times n)$ output matrix. The DEA model is then specified with the following mathematical programming problem, for a given i-th DMU: [12]

[11] In fact, and as mentioned namely by Coelli et al. (1998), the choice between input and output orientations is not crucial since only the two measures associated with the inefficient units may be different between the two methodologies.

[12] We simply present here the equivalent envelopment form, derived by Charnes et al. (1978), using the duality property of the multiplier form of the original programming model.

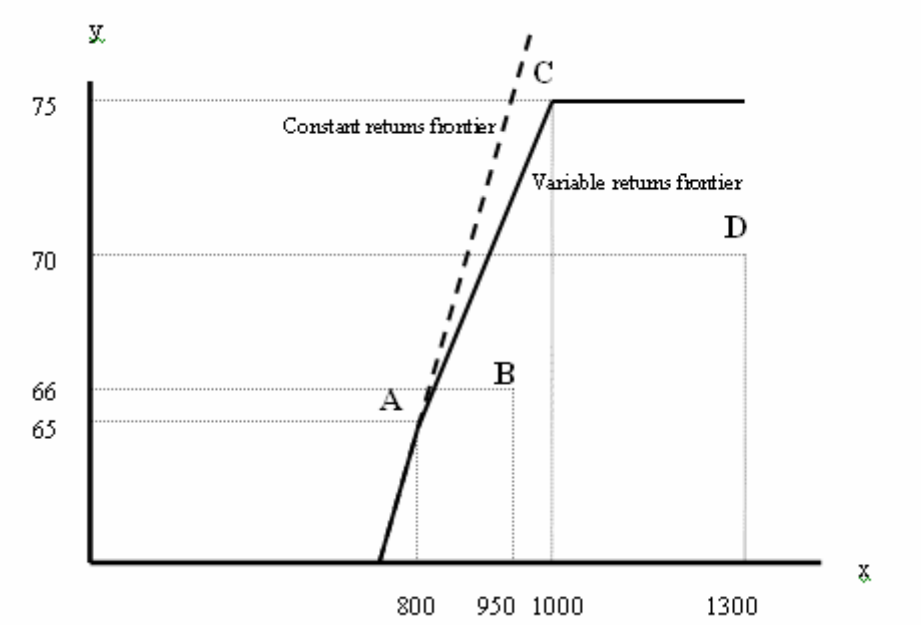
$$
\begin{aligned}
&Min\ _{\theta,\lambda}\theta \\
&\text{s. to}\ \ -y_i + Y\lambda \geq 0 \\
&\qquad \theta x_i - X\lambda \geq 0 \\
&\qquad n1'\lambda = 1 \\
&\qquad \lambda \geq 0
\end{aligned}
\quad . \qquad (6)
$$

In problem (6), θ is a scalar (that satisfies $\theta \leq 1$), more specifically it is the efficiency score that measures technical efficiency. It measures the distance between a country and the efficiency frontier, defined as a linear combination of the best practice observations. With $\theta<1$, the country is inside the frontier (i.e. it is inefficient), while $\theta=1$ implies that the country is on the frontier (i.e. it is efficient).

The vector λ is a $(n \times 1)$ vector of constants that measures the weights used to compute the location of an inefficient DMU if it were to become efficient. The inefficient DMU would be projected on the production frontier as a linear combination of those weights, related to the peers of the inefficient DMU. The peers are other DMUs that are more efficient and are therefore used as references for the inefficient DMU. $n1$ is a n-dimensional vector of ones. The restriction $n1'\lambda = 1$ imposes convexity of the frontier, accounting for variable returns to scale. Dropping this restriction would amount to admit that returns to scale were constant. Notice that problem (4) has to be solved for each of the *n* DMUs in order to obtain the *n* efficiency scores.

Figure 2 illustrates a one input and one output example with variable and constant returns to scale DEA frontiers for four countries: A, B, C, and D. The variable returns to scale frontier unites the origin to point A (not shown in Figure 2), and then point A to point C. The vertical axis and the horizontal axis represent respectively the output (some performance measure) and the input (some expenditure measure) used by the four countries.

Figure 2 – Example of DEA frontiers



For instance, country D may be considered inefficient, in the sense that it performs worse than country C. The latter achieves a better status with less expense. A similar reasoning applies to country B. On the other hand, countries A or C do not show as inefficient using the same criterion.

The constant returns to scale frontier is represented in Figure 4 as a dotted line. In this one input – one output framework, this frontier is a straight line that passes through the origin and country A, where the output/input ratio is higher. Under this hypothesis, only one country is considered as efficient. In the empirical analysis that follows, a priori conceptions about the shape of the frontier were kept to a minimum and the constant returns to scale hypothesis is never imposed.

III.3. Using non-discretionary factors to explain inefficiencies

The analysis via composite performance indicators and DEA analysis have assumed tacitly that expenditure efficiency is purely the result of discretionary (policy and spending) inputs. They do not take into account the presence of “environmental” factors, also known as non-discretionary or “exogenous” inputs. However, such factors may play a relevant role in determining heterogeneity across countries and influence performance and efficiency. Exogenous or non-discretionary factors can have an economic and non-economic origin.

As non-discretionary and discretionary factors jointly contribute to country performance and efficiency, there are in the literature several proposals on how to deal with this issue, implying usually the use of two-stage and even three-stage models.[13] Using the DEA output efficiency scores computed in the previous subsection, we will evaluate the importance of non-discretionary factors below in the context of our new member and emerging market sample. We will undertake Tobit regressions by regressing the output efficiency scores, δ_i, on a set of possible non-discretionary inputs, Z, as as follows

$$\delta_i = f(Z_i) + \varepsilon_i \,. \qquad (7)$$

Previous research on the performance and efficiency of the public sector and its functions that applied non-parametric methods mostly used either FDH or DEA and find significant inefficiencies in many countries. Studies include notably Gupta and Verhoeven (2001) for education and health in Africa, Clements (2002) for education in Europe, St. Aubyn (2003) for education spending in the OECD, Afonso, Schuknecht, and Tanzi (2005) for public sector performance expenditure in the OECD, Afonso and St. Aubyn (2005a, b) for efficiency in providing health and education in OECD countries. De Borger at al. (1994), De Borger and Kerstens (1996), and Afonso and Fernandes (2006) find evidence of spending inefficiencies for the local government sector. Some studies apply both FHD and DEA methods. Afonso and St. Aubyn (2005b) undertook a two-step DEA/Tobit analysis, in the context of a cross-country analysis of secondary education efficiency.

IV. A quantitive assessment of public sector performance and expenditure efficiency

IV.1. Some stylised facts for the EU new member states and comparative countries

As a first step of our quantitative analysis, we will provide some stylised facts i) about expenditure levels and composition, and ii) about the relation between total expenditure and the level of economic development and economic growth. This will help gauge the situation of the new EU member countries and comparable industrialised and emerging market countries from a broader, global perspective.

[13] See Ruggiero (2004) and Simar and Wilson (2004) for an overview.

The country sample which will be used in the efficiency analysis includes the ten EU new member states, (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic, and Slovenia); two candidate countries, (Bulgaria, and Romania); three "old" member countries that underwent a catching up process after entering the EU, (Greece, Ireland and Portugal); and finally nine countries that can also be considered as emerging markets, (Brazil, Chile, Korea, Mauritius, Mexico, Singapore, South Africa, Thailand, and Turkey). The selection of countries was determined by the search for a sufficient number of countries which can be compared with the new EU members and for which reasonably good quality data is available so that an expenditure efficiency analysis becomes meaningful. In addition, we will make occasional references to comparative indicators for OECD or EU countries and country averages.

Table 1 illustrates total expenditure and the public expenditure composition across the sample countries, on an average basis for the period 1999-2003 (or within this period according to data availability). First, it is striking that the new EU member countries on average report similar total spending as the "old" EU members and much higher spending than most other emerging markets. When looking for relatively small governments with spending ratios of less than 40% of GDP, we only find the Baltic countries belonging to this group. Second, the divergence in expenditure ratios is enormous ranging from about 18% to 50% of GDP. The Baltics' relatively low spending ratio is about one quarter less than that of the central European countries but it is significantly higher than the average for the Asian emerging economies (Korea, Singapore, and Thailand).

Table 1 – Public expenditure in sample countries and country groups, % of GDP

	Total spending 1/	Government consumption 2/	Transfers and subsidies 3/	Interest payments 4/	Public investment 5/	Education 6/	Health 7/
Brazil	46.6	19.5	17.1	8.2	1.9	4.6	3.3
Bulgaria	38.6	17.3	15.2	3.2	3.4	3.4	4.0
Chile	24.4	12.6	7.9	1.2	2.7	3.8	2.4
Cyprus	40.0	18.0	11.0	3.3	3.0	5.6	2.5
Czech Republic	40.6	22.7	15.0	1.2	3.4	4.0	6.2
Estonia	36.4	19.7	10.7	0.3	4.1	6.2	4.4
Greece	48.6	16.8	17.0	7.2	3.8	3.7	5.1
Hungary	50.2	22.4	15.0	4.6	3.8	4.8	5.3
Ireland	33.0	14.8	9.3	1.7	3.8	4.4	4.9
Korea	24.4	12.7			5.4	3.8	2.4
Latvia	36.6	21.4	12.7	0.9	1.3	5.8	3.5
Lithuania	33.3	20.3	11.1	1.5	2.6	5.9	4.5
Malta	45.0	20.7	14.5	3.8	4.4	4.8	6.2
Mauritius	24.7	12.9		3.8	7.5	3.8	2.1
Mexico	25.3	11.7	5.2	4.6	3.8	4.6	2.6
Poland	43.2	17.9	17.9	2.8	3.3	5.1	4.2
Portugal	46.2	20.7	14.3	3.1	3.7	5.7	6.2
Romania	33.7	15.7	13.7	2.3	1.9	3.4	3.8
Singapore	21.0	11.4	8.7	0.8			1.4
Slovak Republic	43.8	20.0	14.2	3.5	2.9	4.1	5.2
Slovenia	42.1	20.2	18.6	2.3	2.9		6.0
South Africa	26.3	18.4		4.5	2.7	5.7	3.6
Thailand	17.8	11.2			7.7	5.3	2.3
Turkey	42.7	13.8		21.3	4.6	3.5	4.0
Average	36.0	17.2	13.1	3.9	3.7	4.6	4.0
Max	50.2	22.7	18.6	21.3	7.7	6.2	6.2
Min	17.8	11.2	5.2	0.3	1.3	3.4	1.4
New EU members	41.1	20.3	14.1	2.4	3.2	5.2	4.8
Baltic countries	35.4	20.5	11.5	0.9	2.7	6.0	4.1
Other new EU	43.5	20.3	15.2	3.1	3.4	4.7	5.1
Asian NIC	21.0	11.8	8.7	0.8	6.6	4.6	2.0
Other NIC	32.8	15.2	11.8	6.1	3.5	4.1	3.2
OECD 1990s 8/	46.5	19.8	15.1		3.0	5.4	6.2

1/, 2/, 3/, 4/, 5/ - Average for 1999-2003, source: IMF World Economic Outlook (WEO), and AMECO.
6/ Average for 1998-2001, source: World Bank, WDI 2003.
7/ Average for 1998-2002, source: World Bank, WDI 2003.
8/ Source: Afonso, Schuknecht and Tanzi (2005) for OECD 1990s.
Note: columns 2 through 5 report economic expenditure categories, and that the last two columns report functional expenditure categories.

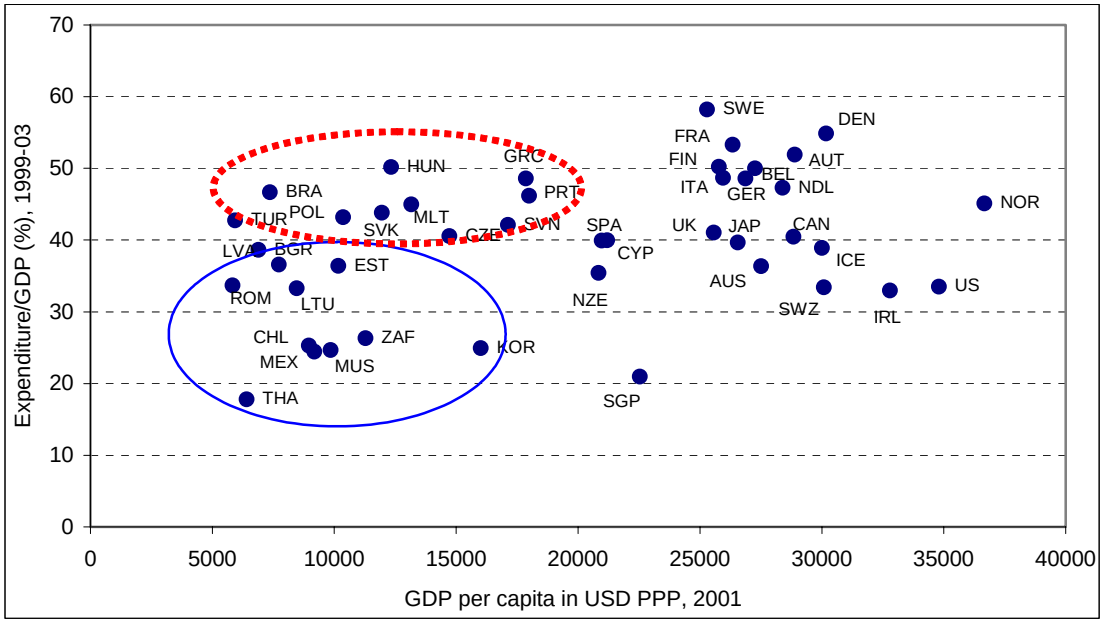
When looking at the expenditure composition, there are further major differences. But these differences are much more pronounced for less productive spending categories. Small government countries tend to spend equally as much, or even significantly more, on productive spending such as investment and education as the rest of the sample countries. New members report public consumption around 20% of GDP, twice as much as Asian emerging economies, with the reverse relation holding for public investment where new members spend roughly 3% of

GDP while the Asian countries report an average above 6% of GDP. Data on transfers and subsidies is more sketchy but huge differences are noteworthy: large welfare states of similar size as in the old EU members predominate in many of the new member countries (with the Baltics' featuring somewhat lower expenditure) while such spending in Asian emerging economies is only fractional. When looking at education, differences across country groups are much smaller than for total spending. New members, old EU members and other emerging markets are not far apart from each other. In health, differences are again very significant where central European countries spend almost 2 and half times as much in % of GDP as the Asian emerging economies.

To further improve our picture of the expenditure situation in the sample countries, we look at per capita GDP as a proxy for the level of economic development and the total expenditure ratio. Figure 3 provides the evidence. It is interesting to see that the group of poorer new member states has roughly the same level of per-capital income as most emerging markets. Korea, the richest new member states and the poorest old EU members (Greece and Portugal) also report similar per-capita income. Singapore and Ireland would today already fall into the broader category of industrialised countries after rapid catching up over the past decade.

More relevant for the purpose of this study, however, is to look at expenditure ratios relative to per-capita income (industrialised country data is included for reference). The stylised facts confirm that the size of government in the new member countries is much larger than in some of their emerging market peers and only the Baltics fall into the group of countries with relatively small public sectors.

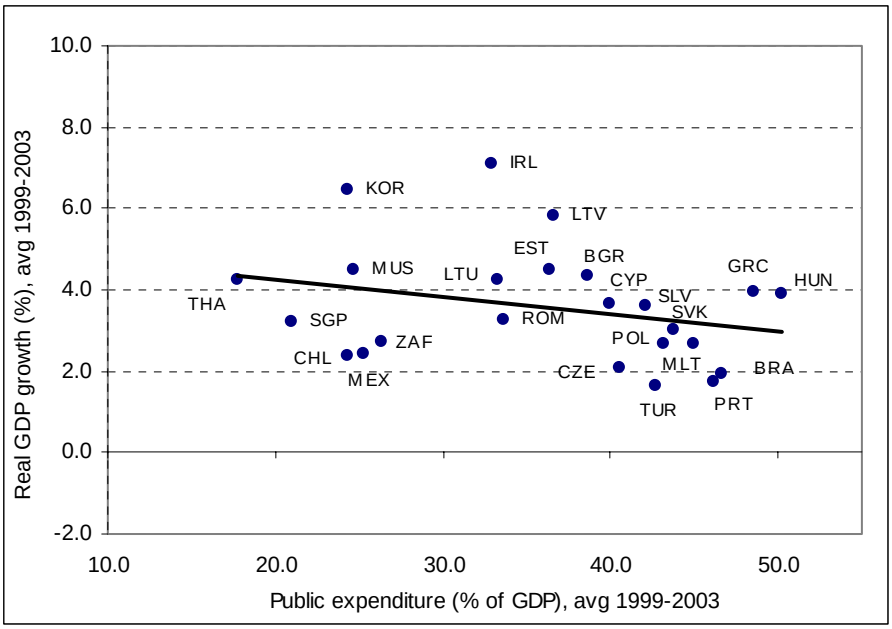
Figure 3 – Size of government and GDP per capita



Source: WDI.
AUS – Australia; AUT – Austria; BEL – Belgium; BGR – Bulgaria; BRA – Brazil; CAN –Canada; CHL – Chile; CYP – Cyprus; CZE – Czech Republic; DEN – Denmark; EST – Estonia; FIN – Finland; FRA – France; GER – Germany; GRC – Greece; HUN – Hungary; ICE – Iceland; IRL – Ireland; ITA – Italy; JAP – Japan; KOR – Korea; LTU – Lithuania; LVA – Latvia; MEX – Mexico; MLT – Malta; MUS – Mauritius; NDL – Netherlands; NOR – Norway; NZE - New Zealand; POL – Poland; PRT –Portugal; ROM – Romania; SGP – Singapore; SPA – Spain; SVK - Slovak Republic; SVN – Slovenia; SWE – Sweden; SWZ – Switzerland; THA – Thailand; TUR – Turkey; UK – United Kingdom; US – United States; ZAF – South Africa.

A key question that is frequently asked is whether such large public sectors in the new member states hurt growth? Alternatively, it has also been asked whether the small public sectors in several of the emerging markets are detrimental to development if basic services and safety nets are not provided. This is an empirical question to which there is so far no clear answer, as illustrated in Figure 4. Per capita growth has been relatively buoyant in recent years in the small government emerging markets, ranging from two to nine percent per annum. This shows that low spending is no obstacle to high growth and the prioritisation on productive spending may also contribute to this picture. Data for the new member states also suggests that high spending is not necessarily detrimental to growth either. Annual growth averaged between two and six percent for this country group in recent years. Productive public spending and other factors such as the boost from impending EU accession may have contributed to this but large governments have so far not proven to be a very harmful obstacle.

Figure 4 – Public expenditure and real GDP growth



Source: WEO. See country names in Figure 4.

The picture might change slightly when not looking at the best linear fit (which is a slightly downward sloping line as indicated). The best overall fit would probably be an inverted U that has its maximum somewhere in the low 30 percent of GDP expenditure range. Indeed, there is illustrative evidence of a negative relation between rising public expenditure and economic growth from about this range, as we get a correlation coefficient of -0.56 when we correlate public spending-to-GDP ratios against real GDP growth for all countries with public spending above 30 percent of GDP. Though very tentative, this would confirm earlier presumptions by the authors that optimum spending for growth might be much lower in many new member and recent emerging market countries.

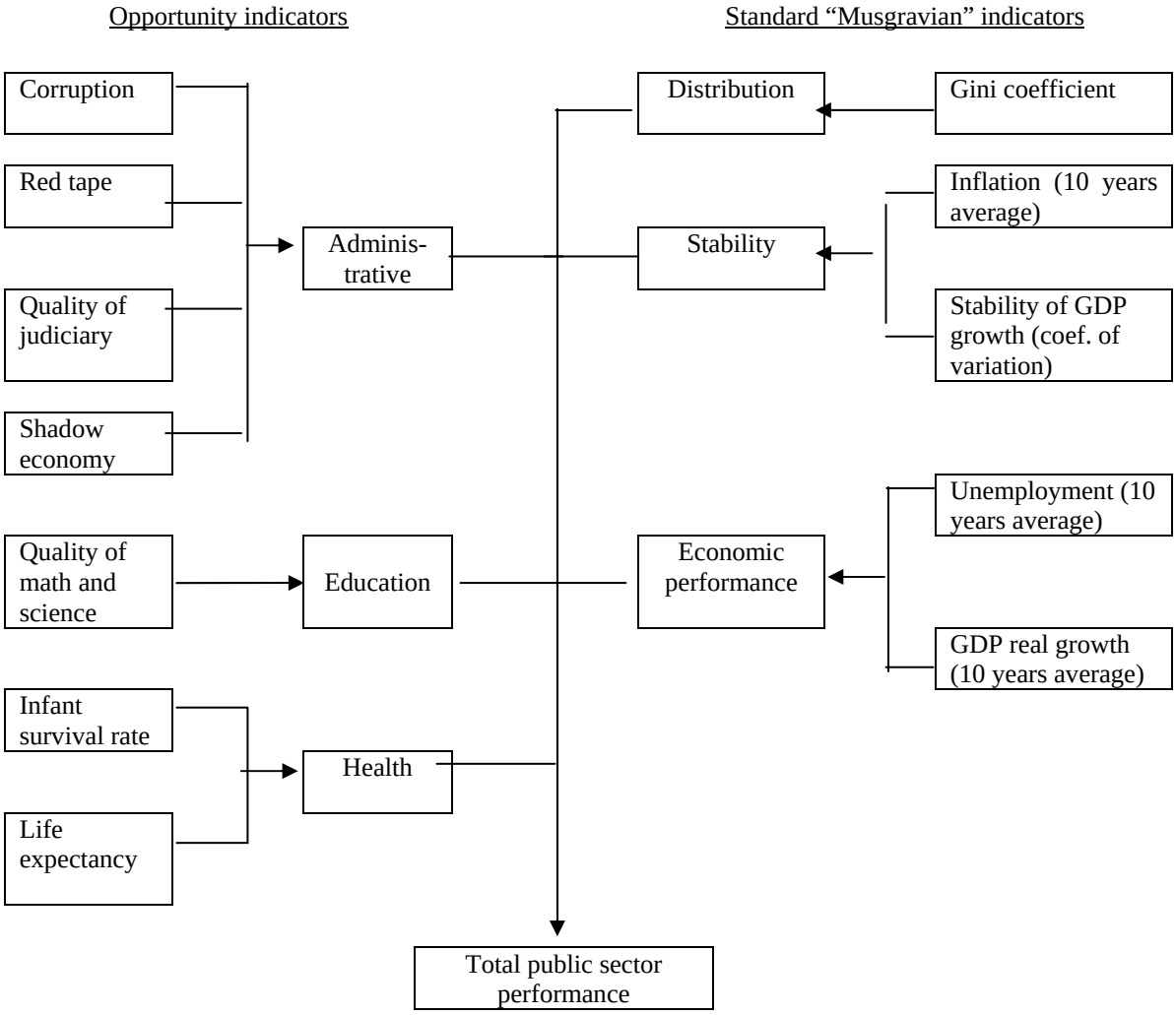
IV.2. Public sector performance and efficiency via composite indicators

In measuring public sector performance and efficiency, we follow closely the methodology described above (as developed by Afonso, Schuknecht and Tanzi (2005)). In summary, our analysis suggests that new EU member countries show an average performance score that, due to relatively high expenditure, does not suggest very efficient use of public resources. Asian emerging markets take most of the top ranks.

IV.2.1. Public sector performance (PSP)

As regards public sector performance we have deviated in a few respects from our earlier study. In the absence of reasonable data on public infrastructure we in particular focus on only three of the four opportunity indicators and the three respective Musgravian indicators. Figure 5 shows how the sectorial and overall indicators are put together (Annex Tables provide primary data).[14]

Figure 5 – Total public sector performance (PSP) indicator



[14] The choice of indicators is slightly different from that used in Afonso, Schuknecht, and Tanzi (2005). In addtion to omitting public infrastructure, education is reflected only by a qualitative measure of education achievement (leaving out secondary school enrolment) and economic performance excludes the level of per-capita GDP (which in this sample would strongly bias in favour of the rich countries).

We compile performance indicators from the various indices giving an equal weight to each of them and the results are reported in Table 2.[15] The results for public sector performance show some interesting patterns, with an overall very diverse picture for the new EU member states. Starting with the overall PSP indicator, the best performers seem to be Singapore, Cyprus and Ireland. Other Asian emerging economies and Malta follow this group of top performers while most new EU member countries and Portugal and Greece post a broadly average performance. Brazil, Bulgaria and Turkey are placed at the bottom end. The size of government per se appears to be a too crude instrument of differentiation, when looking at the score for large public sector countries.

Table 2 – Public Sector Performance (PSP) indicators (2001/2003)

	Opportunity Indicators			"Musgravian" Indicators			Total public sector performance (equal weights 1/)
Country	Adminis-tration	Human capital	Health	Distribu-tion	Stability	Economic perform.	
Brazil	0.88	0.80	0.96	0.63	0.43	0.77	0.75
Bulgaria	0.80	1.09	0.99	1.17	0.06	0.31	0.74
Chile	1.12	0.86	1.03	0.69	0.92	1.02	0.94
Cyprus		1.12	1.04		1.59	1.54	1.33
Czech Republic	1.00	1.14	1.02	1.19	0.74	0.74	0.97
Estonia	1.25	1.11	0.99	1.00	0.57	0.88	0.97
Greece	0.95	1.04	1.04	1.07	1.67	0.76	1.09
Hungary	1.09	1.16	1.00	1.21	0.97	0.88	1.05
Ireland	1.17	1.11	1.03	1.02	1.64	1.47	1.24
Korea	1.04	1.08	1.01	1.09	1.00	1.60	1.14
Latvia	1.03	0.98	0.98	1.08	0.76	0.88	0.95
Lithuania	0.98	1.12	1.00	1.08	0.37	0.84	0.90
Malta	1.11	1.03	1.04		1.45	1.12	1.15
Mauritius	0.91	0.86	1.00		1.40	1.08	1.05
Mexico	0.80	0.71	1.00	0.75	0.38	1.41	0.84
Poland	0.92	1.08	1.01	1.09	0.83	0.81	0.96
Portugal	1.11	0.88	1.03	0.98	1.30	0.91	1.04
Romania	0.63	1.13	0.98	1.10	0.18	0.63	0.78
Singapore	1.39	1.16	1.05	0.92	2.94	1.71	1.53
Slovak Republic	0.95	1.07	1.01	1.28	1.09	0.77	1.03
Slovenia	1.07	1.13	1.03	1.14	1.35	0.99	1.12
South Africa	1.00	0.66	0.80	0.65	1.23	0.50	0.81
Thailand	1.03	0.99	0.97	0.93	0.94	1.54	1.07
Turkey	0.77	0.75	0.97	0.93	0.17	0.82	0.74
Average 2/	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Max	1.39	1.16	1.05	1.28	2.94	1.71	1.53
Min	0.63	0.66	0.80	0.63	0.06	0.31	0.74
New EU countries	0.99	1.06	1.00	1.09	0.74	0.86	0.96
Baltics	1.06	1.10	1.02	1.14	0.93	0.95	1.03
Other new EU	0.95	1.05	1.00	1.08	0.66	0.82	0.93
Asian NIC	1.11	1.00	1.00	0.93	1.76	1.44	1.21
Other NIC	0.97	0.91	0.98	0.87	0.96	1.08	0.98

1/ Each sub-indicator contributes 1/6 to total indicator. 2/ Simple averages.

[15] The relevant time period for the several sub-indicators varies a little according to the availability of data but is essentially reported to 2001/2003 with some variables being used as an average of longer time spans (see the Annex for the precise periods).

When comparing the results for the best performers in this study with those from our earlier study on industrialised OECD countries, it is noteworthy that Ireland was "only" an average performer. Portugal and Greece which are near-average in this group were amongst the weakest in the former study. The results hence show that public sector performance is on average still somewhat lower in most new EU member countries and emerging markets than in the "old" industrialised countries but a few of them (notably the new member island countries and Asian Emerging economies) have broadly caught up.

With regard to sub-indicators, it is interesting to see that the relatively strong performance of the new EU member states on human capital/education and income distribution contrasts with a relatively weak one for economic performance and stability. There is no clear pattern of distinction between Baltics and Central European countries while the two island countries post strong values for all indicators for which data is available. Asian Emerging economies performed very strongly on administration, human capital and economic stability and growth. Overall performance was very equal as regards health indicators.

IV.2.2. Public sector efficiency (PSE)

Public sector performance must be set in relation to the inputs used in order to gauge the efficiency of the state. We compute indicators of Public Sector Efficiency (*PSE*), taking into account the expenditure related to each sub-indicator as described in section III.1. PSE indicators are presented in Table 3 where, due to data limitations for the pre-1998 period in many countries, averages of the corresponding expenditure item were used for the relatively short period of 1998-2003 (see Annex for precise dates and primary data).

Table 3 – Public sector efficiency (PSE) indicators (2001/2003) 1/

	Opportunity Indicators			"Musgravian" Indicators			Total public sector efficiency (equal weights 2/)
Country	Adminis-tration	Human capital	Health	Distribution	Stability	Economic perform.	
Brazil	0.78	0.81	1.15	0.48	0.33	0.59	0.69
Bulgaria	0.79	1.49	1.00	1.01	0.06	0.29	0.77
Chile	1.53	1.04	1.70	1.15	1.37	1.51	1.38
Cyprus		0.92	1.66		1.44	1.39	1.08
Czech Republic	0.76	1.31	0.66	1.04	0.66	0.66	0.85
Estonia	1.09	0.83	0.91	1.21	0.57	0.87	0.91
Greece	0.97	1.32	0.83	0.83	1.23	0.56	0.96
Hungary	0.83	1.12	0.75	1.05	0.70	0.63	0.85
Ireland	1.36	1.18	0.84	1.44	1.79	1.61	1.37
Korea	1.40	1.31	1.72		1.47	2.36	1.65
Latvia	0.82	0.79	1.14	1.11	0.75	0.87	0.91
Lithuania	0.83	0.88	0.90	1.27	0.40	0.90	0.86
Malta	0.92	0.99	0.68		1.16	0.90	0.78
Mauritius	1.21	1.04	1.91		2.04	1.58	1.56
Mexico	1.18	0.72	1.52	1.90	0.55	2.01	1.31
Poland	0.89	0.98	0.97	0.80	0.69	0.68	0.83
Portugal	0.92	0.71	0.66	0.90	1.01	0.71	0.82
Romania	0.69	1.53	1.03	1.05	0.20	0.68	0.86
Singapore	2.09		2.90	1.38	5.05	2.94	2.39
Slovak Republic	0.82	1.23	0.77	1.18	0.90	0.64	0.92
Slovenia	0.91		0.68	0.81	1.15	0.84	0.88
South Africa	0.93	0.54	0.89		1.69	0.68	0.95
Thailand	1.58	0.86	1.68		1.91	3.11	1.83
Turkey	0.96	0.99	0.98		0.15	0.69	0.63
Average 3/	1.06	1.03	1.16	1.03	1.14	1.15	1.09
Max	2.09	1.53	2.90	1.90	5.05	3.11	2.39
Min	0.69	0.54	0.66	0.48	0.06	0.29	0.63
New EU countries	0.87	1.05	0.87	1.04	0.64	0.77	0.84
Baltics	0.86	1.00	0.78	1.16	0.75	0.81	0.83
Other new EU	0.88	1.07	0.91	1.00	0.59	0.76	0.84
Asian NIC	1.63	0.95	2.16	1.38	3.00	2.54	1.93
Other NIC	1.10	0.95	1.32	0.96	1.11	1.29	1.13

1/ These indicators are the expenditure weighted "counterparts" of the indicators of Table 1.
2/ Each sub-indicator contributes equally to the total indicator.
3/ Simple averages.

The results for measuring public sector efficiency show an accentuation of the findings for public sector performance. This suggests that more public spending often has relatively low returns as regards improved performance (which is consistent with the findings of our earlier study for industrialised countries). Most low performers, including most new EU member states range between 0.8 and 0.9 and Cyprus is the only new member country with an average PSE score. Countries with a small government sector post a higher PSE score than the average (and hence even more so than the countries with "big" governments). The emerging countries of Asia plus Mauritius have most of the highest scores as their good performance is achieved with low public spending.

When looking at sub-indices, the new member states efficiency scores are near average on human capital and on income distribution. In all other areas, PSE scores are well below average for the new EU member states. Note also that the income distribution efficiency score is highest in the countries with smaller welfare states. This confirms findings elsewhere that welfare programmes in (rich and) poor countries are often poorly targeted and benefit those with special interests rather than those in need (Alesina (1998) and Schuknecht and Tanzi (2005)).

All in all the results suggest that efficiency differs enormously across countries. In the new member states, a relatively average performance (PSP scores) in most countries is "bought" with too many inputs so that efficiency (PSE) is low. In the next section, we will analyse whether these findings are confirmed by using a DEA approach.

IV.3. Relative efficiency analysis via a DEA approach

We used a DEA approach as described above, using as our output measure the PSP composite indicator reported in Table 2 and as an input measure the total government spending as a ratio of GDP. Table 4 presents both the input and the output oriented efficiency coefficients of the variable returns to scale analysis while the constant returns to scale coefficients are also reported for completeness.

The results largely confirm the findings of the earlier "macro" approach of determining efficiency of the public sector. New member states are ranked between 9 and 24 on input scores and between 3 and 18 on output scores, hence reflecting rather diverse and often below average efficiency. Two countries that also had amongst the top PSE scores are located on the frontier: Singapore and Thailand. Korea, Chile and Mauritius come next. Brazil, Greece and Hungary find themselves at the bottom of the list while most new member states fill the middle ranks. From an input perspective the highest-ranking country uses 1/3 of the input that the bottom ranking one uses to attain a certain PSP score. The average input score of 0.55 hints to the possibility that, for the level of output they are attaining, countries could use around 45 per cent less resources.

From an output perspective, the top performer achieves twice as much output as the least efficient country with the same input. The average output score of 0.67 implies that on average, for the level of input they are using, the countries are only obtaining around 2/3 of the output they should deliver if they were deemed efficient.

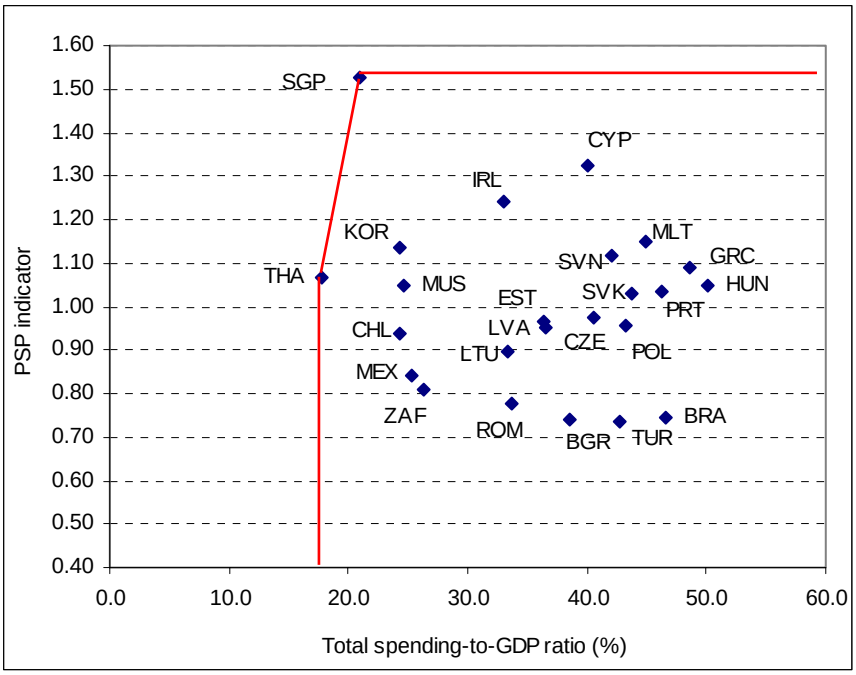
Table 4 – DEA results: one input, one output

Country	Input oriented		Output oriented		CRS TE
	VRS TE	Rank	VRS TE	Rank	
Brazil	0.381	22	0.488	22	0.219
Bulgaria	0.461	14	0.483	23	0.262
Chile	0.730	4	0.615	17	0.529
Cyprus	0.489	11	0.867	3	0.454
Czech Republic	0.439	15	0.637	13	0.329
Estonia	0.489	12	0.632	14	0.364
Greece	0.369	23	0.713	8	0.307
Hungary	0.355	24	0.687	9	0.287
Ireland	0.576	8	0.813	4	0.517
Korea	0.749	3	0.743	6	0.639
Latvia	0.486	13	0.624	16	0.357
Lithuania	0.535	9	0.588	18	0.370
Malta	0.408	19	0.753	5	0.350
Mauritius	0.721	5	0.686	10	0.583
Mexico	0.703	6	0.551	19	0.456
Poland	0.412	18	0.627	15	0.304
Portugal	0.385	21	0.678	11	0.308
Romania	0.528	10	0.509	21	0.316
Singapore	1.000	1	1.000	1	1.000
Slovak Republic	0.406	20	0.674	12	0.322
Slovenia	0.431	16	0.731	7	0.364
South Africa	0.676	7	0.529	20	0.421
Thailand	1.000	1	1.000	1	0.822
Turkey	0.416	17	0.482	24	0.236
Average	0.548		0.671		0.422
Minimum	0.355		0.482		0.219
Standard dev.	0.186		0.144		0.186

CRS TE – constant returns to scale technical efficiency.
VRS TE – variable returns to scale technical efficiency.

Figure 6 presents the theoretical production possibility frontier associated with the aforementioned set of DEA results. It shows how far the distance is between the bulk of countries and the most efficient ones. Nevertheless, there are still very marked differences between the top, medium and bottom performers inside the production possibility frontier. To get a clearer picture of differences when abstracting from the best performer we treat Singapore as an “outlier” and recalculate the DEA without it.

Figure 6 – Theoretical production possibility frontier: one input, one output



BGR – Bulgaria; BRA – Brazil; CHL – Chile; CYP – Cyprus; CZE – Czech Republic; EST – Estonia; GRC – Greece; HUN – Hungary; IRL – Ireland; KOR – Korea; LTU – Lithuania; LVA – Latvia; MEX – Mexico; MLT – Malta; MUS – Mauritius; POL – Poland; PRT – Portugal; ROM – Romania; SGP – Singapore; SVK - Slovak Republic; SVN – Slovenia; THA – Thailand; TUR – Turkey; ZAF – South Africa.

When recomputing the DEA scores in a one input and one output framework without Singapore, the results are somewhat less dramatic and make more countries "feel good" about their public sector (see Table 5 and Figure 7). The corresponding theoretical production possibility frontier now includes Thailand and Cyprus while Korea and Ireland are almost on the frontier. These countries' efficiency scores are equal to, or very close to, unity while they ranged from 0.49 to 0.87 before (except Thailand which was also at unity). New EU member states are spread over ranks 1 to 24 (input scores) and 1 to 18 (output scores), respectively.

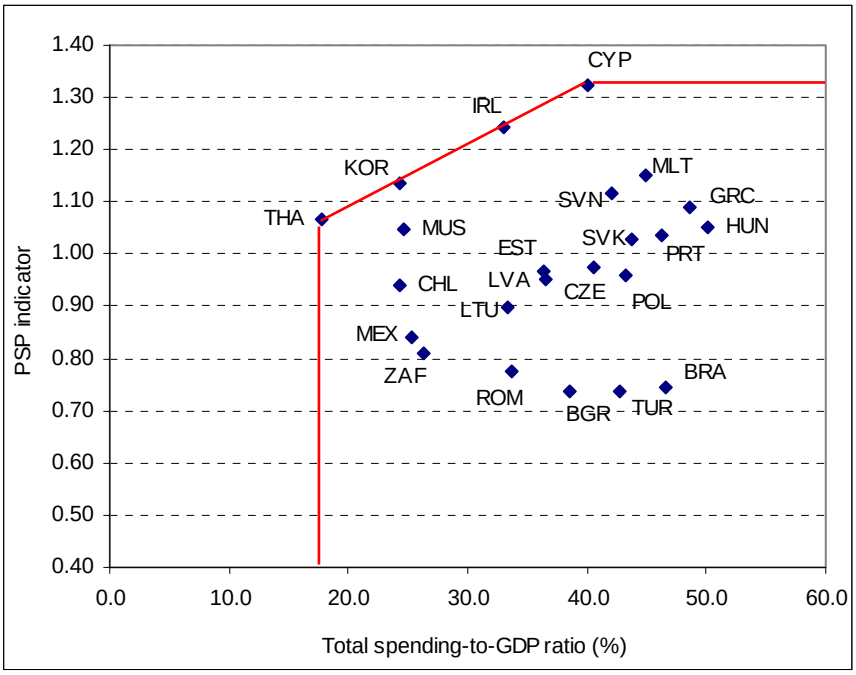
Table 5 – DEA results: one input, one output (excluding Singapore)

Country	Input oriented		Output oriented		CRS TE
	VRS TE	Rank	VRS TE	Rank	
Brazil	0.381	22	0.562	22	0.267
Bulgaria	0.461	15	0.564	21	0.319
Chile	0.730	5	0.823	8	0.644
Cyprus	1.000	1	1.000	1	0.553
Czech Republic	0.439	16	0.735	15	0.401
Estonia	0.489	13	0.753	13	0.443
Greece	0.407	19	0.822	9	0.374
Hungary	0.355	23	0.792	10	0.349
Ireland	0.997	3	0.999	3	0.629
Korea	0.976	4	0.994	4	0.778
Latvia	0.486	14	0.742	14	0.435
Lithuania	0.535	10	0.720	18	0.450
Malta	0.555	9	0.868	6	0.427
Mauritius	0.721	6	0.914	5	0.709
Mexico	0.703	7	0.730	16	0.556
Poland	0.412	18	0.723	17	0.370
Portugal	0.385	21	0.782	11	0.374
Romania	0.528	11	0.621	20	0.385
Slovak Republic	0.406	20	0.777	12	0.393
Slovenia	0.526	12	0.843	7	0.443
South Africa	0.676	8	0.693	19	0.512
Thailand	1.000	1	1.000	1	1.000
Turkey	0.416	17	0.555	23	0.287
Average	0.591		0.783		0.482
Minimum	0.355		0.555		0.267
Standard dev.	0.219		0.137		0.174

CRS TE – constant returns to scale technical efficiency.
VRS TE – variable returns to scale technical efficiency.

The results also show that input scores have not changed that much for most countries. This is because the lowest spending country, Thailand, also has a PSP score higher than most sample countries. Hence for these countries, input efficiency did not change. Only those with higher performance are now assessed relative to the other countries on the production possibility frontier and post a higher input efficiency score. The average increased from 0.55 to 0.59. As regards output efficiency, changes are more substantial if the reference point for countries with large public sectors is not any more Singapore but Cyprus, Ireland and Korea. The average increased from 0.67 to 0.78.

Figure 7 – Theoretical production possibility frontier: one input, one output (excluding Singapore)



BGR – Bulgaria; BRA – Brazil; CHL – Chile; CYP – Cyprus; CZE – Czech Republic; EST – Estonia; GRC – Greece; HUN – Hungary; IRL – Ireland; KOR – Korea; LTU – Lithuania; LVA – Latvia; MEX – Mexico; MLT – Malta; MUS – Mauritius; POL – Poland; PRT – Portugal; ROM – Romania; SVK - Slovak Republic; SVN – Slovenia; THA – Thailand; TUR – Turkey; ZAF – South Africa.

The above calculations could be seen as an approximation of potential direct costs of inefficiency in the provision of public services. However, indirect costs, implying a higher loss for consumer welfare should also be taken into account. This is outside the scope of our paper, but Afonso and Gaspar (2005) address this issue.

We can now compare the results of our composite indicator analysis of performance and efficiency with that of DEA analysis. Table 6 reports DEA input and output efficiency scores and ranks (as shown in Table 4) together with PSE scores (from Table 3) and ranks. The two methods provide rather similar results as reflected in very high correlation coefficients for scores and ranks across methods. This is evidence for a certain robustness of our results.

Table 6 – Comparison of country scores and ranks across methods

	DEA Analyis				Public Sector Efficiency (PSE)	
Country	Input oriented		Output oriented			
	Score	Rank	Score	Rank	Score	Rank
Brazil	0.381	22	0.488	22	0.69	23
Bulgaria	0.461	14	0.483	23	0.77	22
Chile	0.73	4	0.615	17	1.38	5
Cyprus	0.489	11	0.867	3	1.08	8
Czech Republic	0.439	15	0.637	13	0.85	17
Estonia	0.489	12	0.632	14	0.91	12
Greece	0.369	23	0.713	8	0.96	9
Hungary	0.355	24	0.687	9	0.85	17
Ireland	0.576	8	0.813	4	1.37	6
Korea	0.749	3	0.743	6	1.65	3
Latvia	0.486	13	0.624	16	0.91	12
Lithuania	0.535	9	0.588	18	0.86	15
Malta	0.408	19	0.753	5	0.78	21
Mauritius	0.721	5	0.686	10	1.56	4
Mexico	0.703	6	0.551	19	1.31	7
Poland	0.412	18	0.627	15	0.83	19
Portugal	0.385	21	0.678	11	0.82	20
Romania	0.528	10	0.509	21	0.86	15
Singapore	1	1	1	1	2.39	1
Slovak Republic	0.406	20	0.674	12	0.92	11
Slovenia	0.431	16	0.731	7	0.88	14
South Africa	0.676	7	0.529	20	0.95	10
Thailand	1	1	1	1	1.83	2
Turkey	0.416	17	0.482	24	0.63	24
Correlation	Score	Rank	Score	Rank		
DEA input-PSE	0.91	0.77	-	-		
DEA output-PSE	-	-	0.71	0.56		

IV.4. Explaining inefficiencies via non-discretionary factors

As a final step, we extend our analysis to exogenous factors that explain expenditure efficiency (see section III.3 for methodical issues). It is probably reasonable to conjecture that expenditure efficiency depends on the "technology" applied in the public sector, on factors that influence the ability of private agents to protect their resources from public claims, on the monitoring capacities of public and private agents, and on international constraint. The variables and underlying hypotheses we test are the following:

i) Secondary school enrolment. This variable aims to proxy the level of education of the population in a given country. More educated people are hypothesized to be better able to monitor the activities of politicians and bureaucrats and ultimately

sanction crass inefficiency. But more education is also likely to imply better educated and trained (and hence more efficient) civil servants.

ii) The competence of the civil (survey results presented in the Global Competitiveness Report, see Annex for sources and explanations). This variable aims to measure greater productivity and efficiency in the public sector through better training etc. It is expected to be correlated with the education variable.

iii) Per capita GDP. This variable aims to proxy the physical capital stock which facilitates an efficient production of public goods and services but which may also facilitate monitoring of policy makers.

iv) An indicator of property rights. Secure property rights make it more difficult for governments to extract wealth/rents from the private sector. They also facilitate holding governments accountable for their actions.

v) Trade openness (exports and imports as a share of GDP). This indicator proxies the degree of international competition over labour and capital that would penalise public inefficiency disproportionately.

vi) Transparency in public policy. This is another indicator that should measure the ease of monitoring public officials.

vii) Other more direct indicators of political accountability (such as civil liberty, political rights or checks and balances) do not show much variation for this country group as almost all of them are in the top group.

Exogenous factors could also include other factors that could be detrimental or favourable to efficiency (such as the climate, the cultural background) for which economically meaningful hypotheses are less readily available. We do not include such variables in our analysis.

Using the DEA output efficiency scores computed in the previous subsection, we now evaluate the importance of non-discretionary inputs via Tobit regressions where output efficiency scores are regressed on our choice of exogenous, non-discretionary factors. Table 7 confirms the relevance of several of our hypotheses and the variables chosen to test them.

Table 7 – Censored normal Tobit results

(dependent variable: output efficiency scores from Table 5)

	1	2	3	4	5
Per-capita GDP	7.08E-06 ***	6.68E-06 **	6.75E-06 **	7.08E-06 **	1.33E-05 **
	(2.18)	(2.01)	(2.04)	(2.25)	(2.12)
Property rights	0.102 ***	0.095 ***	0.101 ***	0.127 ***	0.063 *
	(6.57)	(5.07)	(6.60)	(4.54)	(1.76)
Competence of civil service	0.069 ***		0.062 **	0.075 ***	0.109 ***
	(2.80)		(2.12)	(3.06)	(3.02)
Secondary school enrolment		0.003 ***			
		(2.60)			
Trade openness			2.46E-04		
			(0.46)		
Public trust in politicians				-0.055	
				(-1.08)	
Transparency in government					0.010
					(0.42)
$\hat{\sigma}_{\varepsilon}$	0.081	0.086	0.083	0.081	0.083
Nº of observations	20	20	20	20	16

$\hat{\sigma}_{\varepsilon}$ – Estimated standard deviation of ε.

The *z* statistics are in brackets.

*, **, *** - Significant at the 10, 5 and 1 per cent level respectively.

The Tobit analysis suggests that the security of property rights, per capita GDP, the competence of civil servants, and the education level of people positively affect expenditure efficiency. Due to significant correlation, however, the two competence/education variables are only significant in separate regressions while the other two variables are robust over all specifications. International trade openness, trust in politicians and transparency of the political system have not been found to display a significant influence on expenditure efficiency (even though only the coefficient for public trust in politicians had the wrong sign). The regressions' standard deviation also points to a reasonable model fit.

V. Conclusion

In this paper we analysed public sector efficiency in the new member states of the European Union as compared to emerging markets. We start with a conceptual discussion of expenditure efficiency measurement issues where challenges regarding the measurement of costs, the definition of goals and the measurement of outcomes are significant. Taking these challenges into account, we calculate efficiency scores and rankings by applying a range of measurement techniques to the new EU member countries and a selection of emerging markets, catch-up economies, and EU candidate countries.

The results of our analysis show that expenditure efficiency across new EU member states is rather diverse, especially compared to the group of top performing emerging markets in Asia. From the analysis of composite public sector performance (PSP) and efficiency (PSE) scores we find that countries with lean public sectors and public expenditure ratios not far from 30% of GDP tend to be most efficient. PSE scores of the most efficient countries are more than twice as high as those of the poorest performers.

From the DEA results we see that a small set of countries define or are very close to the theoretical production possibility frontier: Singapore, Thailand, Cyprus, Korea, and Ireland. From an input perspective the highest ranking country uses 1/3 of the input that the bottom ranking one uses to attain a certain PSP score. The average input scores suggest that countries could use around 45 per cent less resources to attain the same outcomes if they were fully efficient. Average output scores suggest that countries are only delivering around 2/3 of the output they could deliver if they were on the efficiency frontier.

Finally we examine via Tobit analysis the influence of non-discretionary factors, notably non-fiscal variables, on expenditure efficiency. The study shows that per-capita income, public sector competence and education levels as well as the security of property rights seem to facilitate the prevention of inefficiencies in the public sector.

From a policy perspective, one should be careful to draw overly strong conclusions and we have referred to a number of caveats in the course of the paper. Nevertheless, it is apparent that many new members states and other emerging markets can still considerably increase the efficiency of public spending by improving the outcomes and by restraining the resource use. The final econometric analysis also suggests that high education levels, a competent civil service and the security of property rights seem to provide an “extra boost” to public expenditure efficiency.

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Annex – Data and sources

Annex Table A – Primary data for performance sub-indicators

	1/	2/	3/	4/	5/	6/	7/	8/	9/	10/	11/	12/	13/	14/
Brazil	4.6	2.8	3.9	4.6	3.3	68.3	31.0	60.7	1.41	220.9	2.6	7.6	7360	71.3
Bulgaria	5.5	2.5	2.7	5.2	5.0	71.7	14.0	26.4	0.14	139.0	0.7	14.6	6890	87.6
Chile	6.3	3.1	4.6	2.4	3.6	75.8	10.0	56.7	1.43	5.5	4.6	7.9	9190	74.5
Cyprus						78.0	5.0		2.31	3.0	4.0	3.2	21190	88.3
Czech Republic	5.2	2.7	4.2	2.6	5.5	74.9	4.0	25.4	0.97	6.0	2.1	7.0	14720	87.1
Estonia	5.9	4.2	5.3	2.1	5.5	70.6	11.0	37.6	1.26	13.7	4.3	10.6	10170	82.8
Greece	4.8	2.4	4.7	3.5	4.6	78.0	5.0	32.7	3.91	5.4	3.3	10.3	17440	87.4
Hungary	5.8	2.7	4.9	2.3	5.7	71.5	8.0	24.4	2.64	14.2	3.5	7.8	12340	87.2
Ireland	6.0	3.4	5.2	2.3	5.3	76.6	6.0	35.9	2.53	3.1	7.9	7.8	32410	85.8
Korea	5.3	3.2	4.1	2.8	4.7	73.6	5.0	31.6	1.08	4.1	5.4	3.7	15090	90.9
Latvia	4.9	3.7	4.2	3.6	4.8	70.4	17.0	32.4	1.66	10.4	4.7	12.9	7730	74.4
Lithuania	5.5	2.8	3.3	2.4	5.2	72.7	8.0	32.4	0.63	15.4	3.4	8.4	8470	88.6
Malta	6.1	2.9	5.3	3.0	4.9	78.2	5.0		1.47	2.7	3.8	5.2	13160	79.2
Mauritius	4.6	2.2	4.4	3.3	4.2	72.1	17.0		3.26	6.3	4.8	7.3	9860	64.2
Mexico	5.0	2.3	3.3	5.0	3.1	73.4	24.0	53.1	0.70	15.5	2.7	3.1	8430	59.7
Poland	4.8	2.8	3.9	3.7	4.7	73.5	8.0	31.6	2.10	13.2	4.3	13.7	9450	90.9
Portugal	5.8	2.8	5.7	3.0	3.2	75.8	5.0	38.5	1.53	3.3	2.6	5.7	18150	85.2
Romania	3.6	2.0	2.4	5.5	5.9	69.9	19.0	31.1	0.46	58.5	2.1	9.3	5830	79.6
Singapore	6.7	5.1	5.2	1.4	6.5	78.4	3.0	42.5	1.06	1.1	5.1	3.2	22680	74.3
Slovak Republic	5.2	2.2	3.2	1.6	5.6	73.2	8.0	19.5	2.58	8.4	4.2	15.7	11960	74.9
Slovenia	5.8	2.8	4.3	2.0	5.3	75.6	4.0	28.4	3.61	9.7	4.1	7.3	17130	88.6
South Africa	4.9	2.9	5.6	4.5	2.8	47.1	56.0	59.3	2.90	7.3	2.8	25.3	11290	57.2
Thailand	5.1	3.2	4.8	3.7	4.5	69.0	24.0	41.4	0.58	3.6	3.4	3.0	6400	79.8
Turkey	4.1	2.5	3.7	5.7	4.0	69.8	36.0	41.5	0.46	69.8	2.8	7.2	5890	51.3
Average	5.3	2.9	4.3	3.3	4.7	72.4	13.9	37.3	1.7	26.7	3.7	8.7	12635	78.8

1/ Corruption index (1 to 7).
2/ Red tape (burden of regulation) index (1 to 7, good).
3/ Quality of judiciary index (1 to 7, good).
4/ Shadow economy index (1 to 9, bad). We used the following transformation *9-I*, where *I* is the shadow economy index.
5/ Quality of math and science education index.
6/ Life expectancy at birth, years, 2001.
7/ Infant mortality rate (*IMR*), 2001. We used the infant survival rate, *ISR*=(1000-*IMR*)/1000.
8/ Gini coefficient, 2003 or latest year. We used the construction *100-Gini*.
9/ Coefficient of variation (inverse) of average real GDP growth for 1994-2003.
10/ Average inflation, 1994-2003. We used its inverse.
11/ Average GDP real growth rate, 1994-2003.
12/ Average unemployment, 1994-2003.
13/ Per capita GDP, PPP USD, 2001.
14/ Secondary school enrolment ratio, 2001 or latest.

Sources:
1/, 2/, 3/, 4/, 5/ - Global Competitiveness Report, 2003/2004 edition.
6/, 7/, 13/, 14/ - World Bank, WDI 2003.
8/ - World Bank, World Development Report, 2003 edition.
9/, 10/, 11/, 12/ - IMF World Economic Outlook (WEO database).

Annex Table B – Primary data for the non-discretionary factors

	GDP per capita 1/	Property rights 2/	Competence of public officials 3/	Secondary school enrolment 4/	Degree of openness 5/	Public trust of politicians 6/	Transparency 7/
Brazil	7360	5.0	2.4	71.3	29.15	2.2	4.51
Bulgaria	6890	3.2	3.3	87.6	116.20	2.3	
Chile	9190	5.6	2.1	74.5	69.15	2.9	6.64
Cyprus	21190			88.3	95.53		
Czech Republic	14720	4.4	2.3	87.1	126.64	1.9	3.60
Estonia	10170	4.8	3.0	82.8	156.22	2.8	5.96
Greece	17440	5.0	1.8	87.4	48.59	2.5	3.45
Hungary	12340	5.3	2.8	87.2	131.49	2.6	3.50
Ireland	32410	6.1	3.6	85.8	151.31	3.2	5.47
Korea	15090	4.7	3.0	90.9	73.51	2.1	4.21
Latvia	7730	4.3	3.1	74.4	97.51	2.3	
Lithuania	8470	4.2	3.4	88.6	109.46	1.9	
Malta	13160			79.2	163.55		
Mauritius	9860	5.4	2.6	64.2	115.24	2.6	
Mexico	8430	4.6	2.6	59.7	57.30	2.5	4.53
Poland	9450	4.6	2.7	90.9	71.28	2.4	2.21
Portugal	18150	5.3	2.2	85.2	66.59	3.2	5.09
Romania	5830	4.5	2.6	79.6	80.38	3.1	3.23
Slovak Republic	11960	5.2	2.0	74.9	156.87	2.8	4.28
Slovenia	17130	4.8	3.4	88.6	112.97	3.0	3.70
South Africa	11290	5.3	1.9	57.2	53.69	2.9	6.05
Thailand	6400		2.6	79.8	124.31	2.8	5.66
Turkey	5890	4.2	2.1	51.3	58.05	1.9	4.43

1/ GDP per capita PPP, 2001, USD.
2/ Financial assets and wealth are (1=poorly delineated and not protected by law, 7=clearly delineated and protected by law), 2001-02.
3/ The competence of personnel in the public sector is (1=lower than the private sector, 7=higher than the private sector).
4/ Secondary school enrolment, 2001 or latest.
5/ Degree of openness = (Imports+Exports)/GDP, 2003.
6/ Public trust in the honesty of politicians is (1=very low, 7=very high)
7/ Transparency, highest is best, 2003 data.

Sources:
1/, 4/ - World Bank, WDI 2003.
2/, 3/, 6/ - World Economic Forum: *Global Competitiveness Report 2001-2002*.
5/ - IMF World Economic Outlook (WEO database).
7/ - IMD World Competitiveness Yearbook 2004.